Technical manual

MA. 935
Audio Amplifier & AC Power Unit

MP MASTER
MA24121

RACAL ELECTRONICS GROUP

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DANGER LETHAL VOLTAGES

Although every reasonable precaution has been observed in design to safeguard operating personnel this warning is ...

VITAL !

ADJUSTMENTS

EXERCISE GREAT CARE

DO NOT ADJUST ALONE

If possible, when making adjustments, ensure the presence of another person capable of rendering aid.

SERVICING

SWITCH OFF

DO NOT TAMPER WITH INTERLOCKS

Only authorised personnel should be allowed to remove or neutralise the effect of interlocks. Do not rely on interlock switches for protection.

DO NOT SERVICE ALONE

If possible, when servicing, ensure the presence of another person capable of rendering aid.

SEE OVER FOR RESUSCITATION INSTRUCTIONS

FIRST AID in case of Electric Shock

1. Lay victim on his back.
2. Clear victim's mouth and throat.
3. Tilt victim's head back as far as possible and raise his head.
4. Pinch victim's nostrils.
5. Take a deep breath.
6. Cover the victim's mouth with yours and blow, watching his chest rise. Note: Blow forcefully into adults, but gently into children.
7. Move your face away to allow victim to breathe out, watching his chest fall.
8. Repeat first five to ten breaths at a rapid rate; thereafter, take one breath every three to five seconds.
9. Keep victim's head back as far as possible all the time.

Have someone else send for a Doctor

Keep patient warm and loosen his clothing

DO NOT Give liquids until patient is conscious

THIS HANDBOOK REFERS TO EQUIPMENT

SERIAL NUMBER ..... AND SUBSEQUENT

HANDBOOK AMENDMENTS

See Yellow Amendment Sheet Numbers .....

which follow this page. The action called for by the amendments should be carried out by hand as soon as possible.

SEATON
PETER STUNT

RACAL TACTICOM LIMITED

Amendment to

MA935 AUDIO AMPLIFIER & AC POWER UNIT

(100358 - Corrections)

FIGS 4 & 6

Remove and Destroy old drawings.

Insert new Drawings.

AUDIO AMPLIFIER AND A.C. POWER UNIT

TYPE MA935

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AUDIO AMPLIFIER AND A.C. POWER UNIT

TYPE MA.935

INTRODUCTION

1. The Audio Amplifier and A.C. Power Unit type MA935 operates from an a.c. supply of either 100-125 volts or 200-250 volts. The power unit provides a regulated d.c. output of either 18 volts or 24 volts for the 900 Series range of Manpacks, and a regulated d.c. output of 28 volts for the TA9408, 100 Watt Linear Amplifier.

2. The audio amplifier provides amplification for the Manpack audio output and delivers a maximum output of 1.0 Watt into a built-in loudspeaker.

CONSTRUCTION

3. The MA935 is enclosed in a metal case of overall dimensions 364 mm (14.3 in) x 200 mm (7.9 in) x 312 mm (12.3 in). The weight is 21.8 kg (48 lb). The series regulator transistors are mounted on a heat sink assembly at the rear of the unit.

4. The front panel carries all the controls and connectors as follows:

(a) SUPPLY ON/OFF switch

(b) SPEAKER ON/OFF switch

(c) A.C. supply input lead

(d) Two AUDIO sockets

(e) 28V output socket

(f) Power Indicator lamp

(g) Fuse

(h) Earth terminal

ELECTRICAL CHARACTERISTICS

5.

A.C. Mains Input:		100V to 125V or 200V to 250V, 47 to 60Hz, 500 VA.
D.C. Outputs:		(a) 28V nominal at 11A maximum and 18V/24V nominal at 2A maximum.
	or	(b) 28V nominal at 1A maximum and 18V/24V nominal at 3.8A maximum.
Audio Amplifier Sensitivity:		550mV (1mW into 300 ohms) for 1.0W output.
Audio Amplifier Output:		1.0W maximum into 8 ohms.

INSTALLATION

6. (1) Remove the ten screws securing the cover, and remove the cover from the unit.

(2) Ensure that the mains transformer tappings are correctly set for the local mains supply voltage by referring to Fig. 7.

(3) Set the 18V/24V output for the Manpack to the voltage specified below using the method detailed in the Test Procedure (para. 19/20).

Associated Manpack	MA935 18V/24V Output
TRA906	18V
TRA921	18V
TRA922	18V
TRA931	24V
TRA932	24V

(4) Fit the reversible label to the front panel to indicate the selected voltage.

(5) Ensure that the correct fuse is fitted (7.5A for 200V to 250V operation; 15A for 100V to 125V operation).

(6) Connect the MA935 to the Manpack and the TA940B Linear Amplifier as follows:-

(i) 6-way lead between an AUDIO socket on the MA935 and an AUDIO socket on the Manpack.

(ii) 6-way lead between the second AUDIO socket on the MA935 and an AUDIO socket on the TA940B.

(iii) 2-way lead between the 28V socket on the MA935 and the DC SUPPLY plug on the TA940B.

(7) Connect the EARTH terminal of the MA935 to a good earth unless the unit is to be earthed via the mains earth connection.

(8) Connect the mains supply as follows:-

Supply Cable		Mains Supply
Brown Wire	to	Line (L)
Blue Wire	to	Neutral (N)
Yellow/Green Wire	to	Earth (E)

OPERATION

7. Switch ON the supply and set the SPEAKER switch to ON or OFF as required.

CIRCUIT DESCRIPTION

28V Regulated Supply — Fig. 5

8. The 28 volt output at SK3 is compared with the reference voltage developed across zener diode D3. Any change in the voltage level at SK3 is detected by TR4 and the error signal at TR4 collector is applied, via D2, to TR1. The output of TR1 is current amplified by TR11 which drives series regulator TR12-TR15.

9. TR3 is a current source for driving TR1 and is controlled by voltage detector TR4. Diode D2 prevents reverse polarity being applied across TR2 should TR4 be bottomed due to a sudden reduction from full load current to zero load current.

10. Overload protection is provided by TR2 which detects the increase in voltage across R27. The increased drive on TR2 decreases the drive on TR1 and TR11 and hence on series regulator TR12-TR15. The setting of RV1 determines the maximum power dissipated in the MA935.

11. Capacitors C1 and C4 provide r.f. decoupling, and C3/R9 is a phase compensating feedback network which prevents oscillation occurring in the region of 100kHz.

18V/24V Regulated Supply — Fig. 5

12. The 18V/24V supply is regulated in the same way as the 28V supply. Because of the lower current demand from this supply only one series regulator (TR17) is utilized. Diode D13 provides a discharge path for C17, thus protecting TR17, in the event of a short circuit across SK3.

Audio Amplifier — Fig. 6

13. The audio signal at pin F of either SK1 or SK2 is applied, via pin D5 of the Audio Amplifier board, to the two-stage voltage amplifier 4TR1, 4TR2. The output from 4TR2 feeds the driver stages 4TR5, 4TR6. Transistors 4TR5 and 4TR6 function as a complementary pair, to provide push-pull audio drive to the bases of the output transistors 4TR7 and 4TR8.

14. The audio output appearing between pins D2 and D1 is fed to the loudspeaker via switch SB. Negative feedback is applied from the output stage via 4R6 and 4R5 to 4TR1 emitter. Diodes 4D1 and 4D2 provide d.c. bias and thermal stabilisation.

Overload Protection

15. Transistors 4TR3 and 4TR4 provide overload protection for the output transistors. For normal operating conditions, 4TR3 and 4TR4 are non-conducting. Should the amplifier be over-driven, the voltage developed across 4R13 and 4R12 will be sufficient to cause 4TR3 and 4TR4 to conduct. This will limit the base drive available to 4TR6 and 4TR5, and hence limit the maximum output current delivered by 4TR7 and 4TR8.

Muting

16. During transmission, closure of the PTT circuit applies an earth connection via pin D4 to the junction of 4R15 and 4R16. This action mutes the Audio Amplifier preventing acoustic feedback to the transmit audio path. Switch SB also breaks the h.t. feed in the speaker-off mode.

EQUIPMENT REQUIRED FOR TESTING

17. (a) Rheostat(s) to cover the ranges 0-2.2 ohms at 13 amps and 0-8 ohms at 4.5 amps.
(example: Berco DLSM, 168 ohms 15-0.18A)

(b) Multimeter to cover the range 0-100V d.c. and having a resistance of 20,000 ohms/V.
(example: AVO model 8).

(c) Multimeter to cover the range 0-10A d.c.
(example: AVO model 8)

(d) Moving coil d.c. ammeter 0-25A.

(e) Oscilloscope with a frequency range of 0-20kHz and a sensitivity of 50mV/cm.
(example: Advance OS2000)

(f) Variac, 0-260V at 5A.
(example: Zenith 100-RM)

(g) A.F. power meter with a bandwidth of 20kHz an impedance of 8 ohms and an f.s.d. of 1.0W.
(example: Marconi TF893A)

(h) A.F. signal generator with a frequency range of 50Hz - 20kHz and an impedance of 600 ohms.
(example: Advance J2)

(j) A.F. valve voltmeter.
(example: Advance 77C)

(k) Manpack type TRA921, TRA922, TRA931 or TRA932.

(l) Standard handset and Morse Key.

(m) 6-pin plug - Thorn Pygmy PT06W-10-6P.

(n) 2-pin plug - Amphenol MS3106E-16-11P.

TEST PROCEDURE

28 Volt Supply

18. (1) Connect a rheostat (set to 2.2 ohms at 13 amps) in series with a 25 amp d.c. meter, between pins A and B of a 2-pin Amphenol plug and connect it to the 2-pin 28V socket (SK3) on the MA935.

(2) Connect a multimeter, set to its 100V d.c. range, between pins A (positive) and B of the 2-pin plug.

(3) Connect the line input of an oscilloscope to pin A of the 2-pin plug and connect the ground terminal to pin B.

(4) Ensure that the transformer primary connections are correct for a mains supply of 240 volts.

(5) Connect the mains cable from the MA935 to a 5 amp Variac set to 240 volts.

(6) Switch on the mains supply.

(7) Set the SUPPLY switch (SA) on the MA935 to ON and ensure that the indicator lamp is illuminated.

(8) Adjust the rheostat to give a load current of 13 amps and adjust RV2 on the Regulator board to obtain a reading of 28.5 volts on the multimeter.

(9) Adjust RV1 on the Regulator board until the output voltage just starts to fall.

(10) Vary the setting of the rheostat either side of the position set in para. 18 (8) and ensure that the load current does not exceed 13 amps.

(11) Adjust the rheostat to obtain a load current of 11 amps. Measure the a.c. ripple voltage displayed on the oscilloscope and ensure that it does not exceed 60mV peak-to-peak.

(12) Reduce the output of the Variac until the a.c. ripple voltage is 100mV peak-to-peak. Ensure that output voltage of the Variac is not greater than 216 volts.

(13) Connect a shorting link across the rheostat and ensure that the load current is within the limits 0.5 and 3 amps. Remove the shorting link.

(14) Remove the rheostat and increase the output of the Variac to 260 volts. Ensure that the voltage indicated on the multimeter is between 28.5 volts and 30.5 volts.

(15) Using the multimeter, set to its 100V d.c. range, ensure that there is no continuous d.c. potential between:-

pin A of SK3 and chassis
pin B of SK3 and chassis

(16) Set the SUPPLY switch (SA) to OFF and disconnect the test equipment from SK3.

(17) Reset the Variac to 240 volts output.

Manpack Supply (24V Operation)

19. (1) Connect a rheostat (set to 8 ohms at 4.5 amp) in series with a multimeter, set to its 10A d.c. range, between pins B and D of a 6-pin Pygmy plug and connect it to one of the AUDIO sockets (SK1).

(2) Connect a second multimeter, set to its 25V d.c. range, between pins B (positive) and D of the 6-pin plug.

(3) Set the SUPPLY switch (SA) to ON.

(4) Adjust RV4 on the Regulator board to obtain a reading of 24.5 volts on the multimeter.

(5) Adjust the rheostat to obtain a load current of 4.5 amps and adjust RV3 on the Regulator board until the output voltage just starts to fall.

(6) Vary the setting of the rheostat either side of the position set in para. 19 (5) and ensure that the load current does not exceed 4.5 amps.

(7) Re-set the rheostat to maximum resistance (8 ohms).

(8) Connect a shorting link across the rheostat and ensure that the load current is within the limits 0.5 and 3 amps. Remove the shorting link.

(9) Set the SUPPLY switch to OFF and disconnect the test equipment from SK1.

Manpack Supply (18V Operation)

20. (1) Connect a rheostat (set to 8 ohms at 4.5 amps) in series with a multimeter, set to its 10A d.c. range, between pins B and D of a 6-pin Pygmy plug and connect it to one of AUDIO sockets (SK1).

(2) Connect a second multimeter, set to its 25V d.c. range, between pins B (positive) and D of the 6-pin plug.

(3) Set the SUPPLY switch ON and adjust RV4 on the Regulator board to obtain a reading of 18.5 volts on the multimeter.

(4) Adjust the rheostat to obtain a load current of 4.5 amps and adjust RV3 on the Regulator board until the output voltage just starts to fall.

(5) Vary the setting of the rheostat either side of the position set in para. 20 (4) and ensure that the load current does not exceed 4.5 amps.

(6) Re-set the rheostat to maximum resistance (8 ohms).

(7) Connect a shorting link across the rheostat and ensure that the load current is within the limits 0.5 and 3 amps. Remove the shorting link.

(8) Set the SUPPLY switch to OFF and disconnect the test equipment from SK1.

Audio Amplifier

21. (1) Unsolder the grey lead from the loudspeaker.

(2) Connect the line inputs of the oscilloscope and the A.F. power meter to the grey lead of the Amplifier board, and connect the ground terminals to the loudspeaker tag with the blue/brown lead.

(3) Connect the A.F. signal generator and the A.F. valve voltmeter between pins F (line) and D (earth) of a 6-pin Pygmy plug and connect it to one of the AUDIO sockets on the MA935.

(4) Set the frequency of the signal generator to 1kHz and the output level to zero.

(5) Set the SUPPLY switch to ON and the SPEAKER switch to ON.

(6) Increase the output level from the signal generator until the power meter indicates 1.0 Watt. Ensure that the output waveform displayed on the oscilloscope is sinusoidal.

(7) Decrease the output level from the signal generator until the power meter indicates 0.5 Watt. Ensure that input level indicated on the valve voltmeter is not greater than 385 mV. Note the actual level.

(8) Set the frequency of the signal generator to 200Hz maintaining the same input level as noted in para. 21 (7). Ensure that the output level indicated on the power meter is within the limits 100 mW and 300 mW.

(9) Set the frequency of the signal generator to 5kHz maintaining the same input level as noted in para. 21 (7). Ensure that the output level indicated on the power meter is within the limits 400 mW and 600 mW.

(10) Set the SUPPLY switch to OFF and disconnect the test equipment from the AUDIO socket.

(11) Re-solder the grey lead to the loudspeaker.

Overall Check

22. (1) Connect a 6-way AUDIO lead between an AUDIO socket on the MA935 and an AUDIO socket on a Manpack (TRA921, TRA922, TRA931 or TRA932).

(2) Connect a standard handset to the second AUDIO socket on the Manpack.

(3) Set the SUPPLY switch on the MA935 to ON and set the MODE switch on the Manpack to VOICE L.S.B.

(4) Ensure that noise is heard from the loudspeaker (adjust the GAIN control on the Manpack as required).

(5) Operate the 'Pressel' switch on the handset and blow into the microphone. Ensure that sidetone is heard in the handset but that no output is heard from the loudspeaker.

(6) Transfer the 6-way AUDIO lead to the second AUDIO socket on the MA935.

(7) Repeat the procedure detailed in para. 22 (4) and (5).

(8) Connect a morse key to the first AUDIO socket on the MA935.

(9) Select KEY L.S.B. on the Manpack.

(10) Operate the morse key and ensure that sidetone is heard in the loudspeaker.

(11) Set the SUPPLY switch to OFF and disconnect all test equipment from the MA935.

TYPICAL D.C. VOLTAGES

23. The following voltage levels were obtained under no load conditions and with a mains supply input of 240 volts. All measurements were taken with the multimeter negative lead connected to the negative terminal of capacitor C13/C14.

REGULATOR

Manpack Supply set to	18.5 volts			24.5 volts		
Multimeter +ve lead connected to	Emitter	Base	Collector	Emitter	Base	Collector
TR1	29.3V	29.9V	44.0V	29.3V	29.9V	44.0V
TR2	28.2V	27.5V	29.9V	28.2V	27.5V	29.9V
TR3	43.5V	43.0V	30.2V	43.5V	43.0V	30.2V
TR4	6.2V	6.8V	30.2V	6.2V	6.8V	30.2V
TR5	19.0V	19.5V	28.5V	25.3V	25.9V	28.5V
TR6	18.5V	18.4V	19.5V	24.6V	24.5V	25.9V
TR7	28.5V	28.0V	20.0V	28.5V	28.0V	26.0V
TR8	6.2V	6.8V	20.0V	6.2V	6.8V	26.0V
TR11	29.0V	29.3V	44.0V	29.0V	29.3V	44.0V
TR12-TR15	28.5V	29.0V	44.0V	28.5V	29.0V	44.0V
TR16	18.4V	19.0V	28.5V	24.9V	25.5V	28.5V
TR17	18.4V	18.4V	28.5V	24.6V	24.9V	28.5V

TYPICAL D.C. VOLTAGES (Cont'd)

AUDIO AMPLIFIER

D.C. INPUT TO BOARD	18.5 volts			24.5 volts		
Multimeter +ve lead connected to	Emitter	Base	Collector	Emitter	Base	Collector
4TR1	9.3V	8.7V	0.7V	12.1V	11.5V	0.6V
4TR2	0V	0.7V	6.3V	0V	0.6V	8.2V
4TR3	9.5V	9.5V	10.3V	12.3V	12.3V	13.1V
4TR4	9.5V	9.5V	8.9V	12.3V	12.3V	11.7V
4TR5	9.5V	8.9V	0V	12.3V	11.7V	0V
4TR6	9.7V	10.3V	18.5V	12.5V	13.1V	24.5V
4TR7	9.5V	9.7V	18.5V	12.3V	12.5V	24.5V
4TR8	0V	0V	9.5V	0V	0V	12.3V

Intentionally blank

ORDERS FOR SPARE PARTS

In order to expedite handling of spare part orders, please quote:-

(1) Type and serial number of equipment.

(2) Circuit reference, description and Racal part number.

(3) Quantity required.

NOTE: If the equipment is designed on a modular basis, please include the type and description of the module for which the replacement part is required.

LIST OF COMPONENTS

Cct. Ref.	Value Ω	Description	Rat.	Tol. %	Racal Part Number
REGULATOR P.C.B.					
Resistors					
R1	1k	Fixed	1/3W	10	918075
R2	4.7k	Fixed	1/3W	10	919165
R3	68k	Fixed	1/3W	10	918079
R4	4.7k	Fixed	1/3W	10	919165
R5	15	Fixed	1/3W	10	918962
R6	1k	Fixed	1/3W	10	918075
R7	33k	Fixed	1/3W	10	919167
R8	470	Fixed	1/3W	10	919187
R9	1k	Fixed	1/3W	10	918075
R10	4.7k	Fixed	1/3W	10	919165
R11	3.3k	Fixed	½W	5	906018
R12	1k	Fixed	½W	5	906031
R13	1k	Fixed	1/3W	10	918075
R14	4.7k	Fixed	1/3W	10	919165
R15	47k	Fixed	1/3W	10	919188
R16	4.7k	Fixed	1/3W	10	919165
R17	15	Fixed	1/3W	10	918962
R18	1k	Fixed	1/3W	10	918075
R19	33k	Fixed	1/3W	10	919167
R20	470	Fixed	1/3W	10	919187
R21	1k	Fixed	1/3W	10	918075
R22	4.7k	Fixed	1/3W	10	919165
R23	2.2k	Fixed	½W	5	906020
R24	1k	Fixed	1/3W	2	907731
Variable Resistors					
RV1	4.7k	Preset Linear			919511
RV2	470	Preset Linear			919514
RV3	4.7k	Preset Linear			919511
RV4	1k	Preset Linear			919516

LIST OF COMPONENTS (cont'd)

Cct. Ref.	Value (µF)	Description	Rat.	Tol. %	Racal Part Number
REGULATOR P.C.B. (cont'd)					
Capacitors					
C1	0.1	Monolithic	100V	10	921368
C2	220pF	Polystyrene	30V	5	919631
C3	0.01	Fixed		+40 -20	916187
C4	0.1	Monolithic	100V	10	921368
C5	0.1	Monolithic	100V	10	921368
C6	220pF	Polystyrene	30V	5	919631
C7	0.01	Fixed		+40 -20	916187
C8	0.1	Monolithic	100V	10	921368
Diodes					
D1		IN4149			914898
D2		IN4149			914898
D3		BZY88C6V2			911682
D4		IN4149			914898
D5		IN4149			914898
D6		BZY88C6V2			911682
Transistors					
TR1		ZTX237			923171
TR2		ZTX237			923171
TR3		ZTX212			923172
TR4		ZTX237			923171
TR5		ZTX237			923171
TR6		ZTX237			923171
TR7		ZTX212			923172
TR8		ZTX237			923171

LIST OF COMPONENTS (cont'd)

Cct. Ref.	Value Ω	Description	Rat.	Tol. %	Racal Part Number
CHASSIS					
Resistors					
R25	Not used				
R26	Not used				
R27	0.33	Fixed	9W	5	917801
R28	10	Fixed Wirewound	2.5W	5	913571
R29	0.33	Fixed	9W	5	917801
R30	0.33	Fixed	9W	5	917801
R31	0.33	Fixed	9W	5	917801
R32	4.7k	Fixed		5	906022
R33	0.25	Fixed Wirewound	2.5W	10	920902
R34	10	Fixed Wirewound	2.5W	5	913571
Capacitors (μF)					
C9	Not used				
C10	Not used				
C11	1000pF	Ceramic	500V	10	918423
C12	0.1	Monolithic	100V	10	921368
C13	15,000	Electrolytic	63V	-10 +50	917680
C14	15,000	Electrolytic	63V	-10 +50	917680
C15	1000	Electrolytic	63V	-10 +50	920877
C16	1000pF	Ceramic	500V	10	918423
C17	1000	Electrolytic	25V	-10 +50	919117
Diodes					
D7	Not used				
D8	Not used				
D9		BYX25/1000			923404
D10		BYX25/1000			923404
D11		BYX25/1000			923404
D12		BYX25/1000			923404
D13		BYX25/1000			923404

LIST OF COMPONENTS (cont'd)

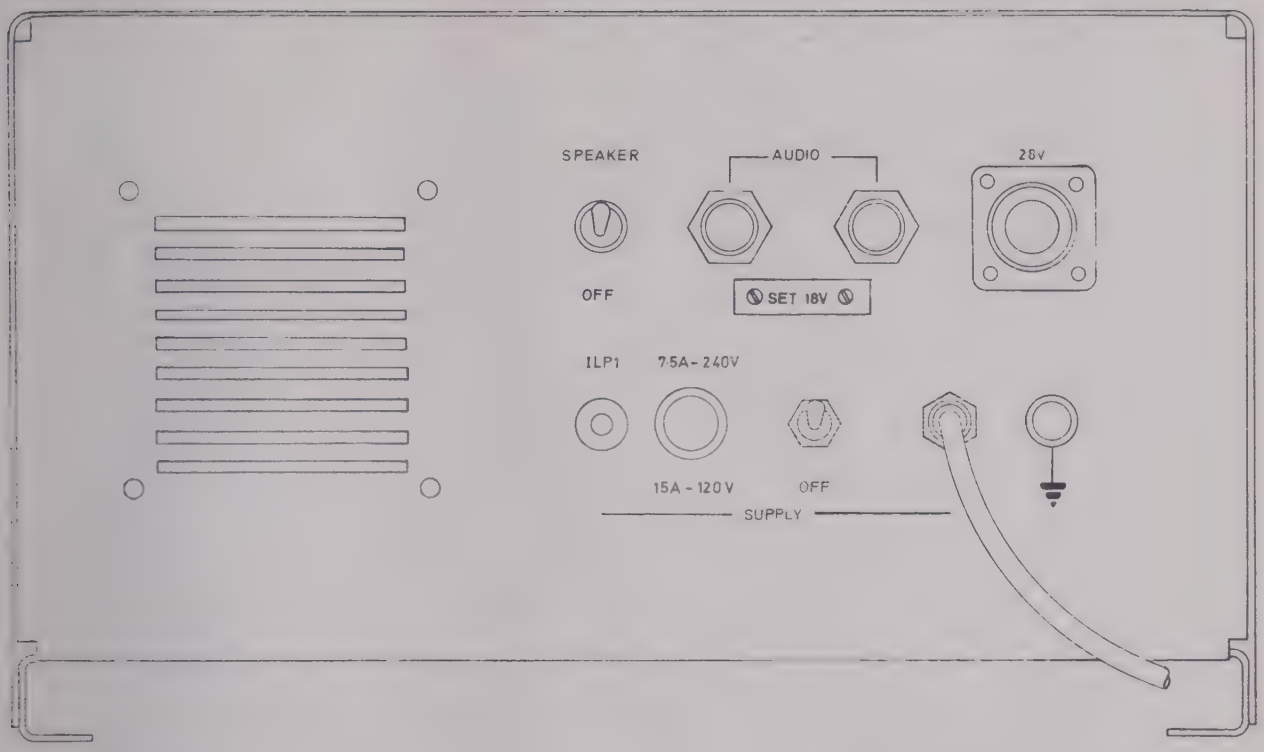
Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part Number
CHASSIS (cont'd)					
Transistors					
TR9	Not used				
TR10	Not used				
TR11		2N3055			906371
TR12		2N3055			906371
TR13		2N3055			906371
TR14		2N3055			906371
TR15		2N3055			906371
TR16		2N3055			906371
TR17		2N3055			906371
Transformers					
T1					710048
Fuses					
FS1	7.5A (240V Operation)				911543
	15A (120V Operation)				917794
Switches					
SA		Toggle, 2-Pole			919251
SB		Toggle, 2-Pole			906883
Miscellaneous					
ILP1		Lampholder, amber with resistor	a.c. 110V		917718
L.S.		Speaker, 8 ohm			917853
		Fuseholder			900005

LIST OF COMPONENTS (cont'd)

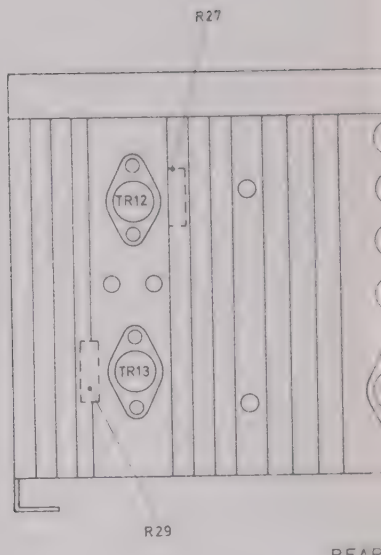
Cct. Ref.	Value Ω	Description	Rat.	Tol. %	Racal Part Number
AUDIO AMPLIFIER PCB					
Resistors					
4R1	56	Fixed	1/3	10	919185
4R2	5.6k	Fixed	1/3	10	919181
4R3	2.2k	Fixed	1/3	10	919169
4R4	6.8k	Fixed	1/3	10	919192
4R5	220	Fixed	1/3	10	919174
4R6	1.5k	Fixed	1/3	10	919180
4R7	6.8k	Fixed	1/3	10	919192
4R8	68	Fixed	1/3	10	919186
4R9	1k	Fixed	1/3	10	918075
4R10	1k	Fixed	1/3	10	918075
4R11	1k	Fixed	1/3	10	918075
4R12	0.82	Wirewound	2½	5	922737
4R13	0.82	Wirewound	2½	5	922737
4R14	10	Fixed	1/3	10	919173
4R15	1k	Fixed	1/3	10	918075
4R16	1k	Fixed	1/3	10	918075
4R17	1k	Fixed	1/3	10	918075
Capacitors (μF)					
4C1	0.01	Fixed	250V	+40 -20	916187
4C2	4.7	Fixed	35V	20	914026
4C3	0.47	Fixed	35V	20	915168
4C4	0.01	Fixed	250V	+40 -20	916187
4C5	4.7	Fixed	35V	20	914026
4C6	0.01	Fixed	63V	20	915173
4C7	4.7	Fixed	35V	20	914026
4C8	0.47	Fixed	35V	20	915168
4C9	680	Electrolytic	25V	-10 +50	919118
Diodes					
4D1		IN4149			914898
4D2		IN4149			914898
4D3		IN4149			914898

LIST OF COMPONENTS (cont'd)

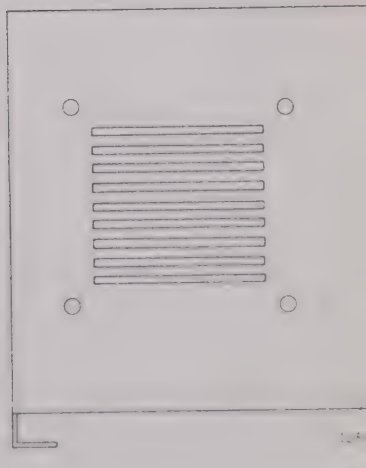
Cct. Ref.	Value	Description	Rat.	Tol. %	Racal Part Number
AUDIO AMPLIFIER PCB (cont'd)					
Transistors					
4TR1		ZTX212			923172
4TR2		ZTX237			923171
4TR3		ZTX237			923171
4TR4		ZTX212			923172
4TR5		ZTX212			923172
4TR6		ZTX237			923171
4TR7		2N3054			911951
4TR8		2N3054			911951



Audio Amplifier
and A.C. Power Unit Type MA.935 Fig. 1

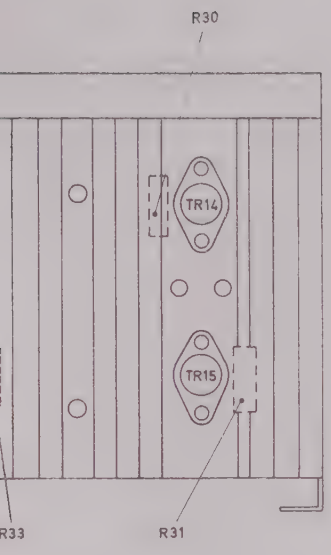


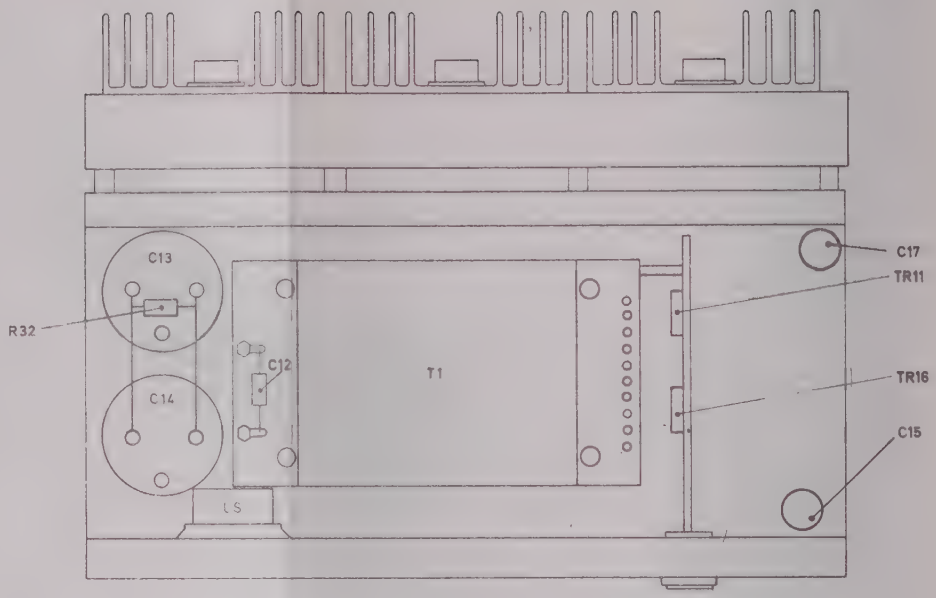
REAR



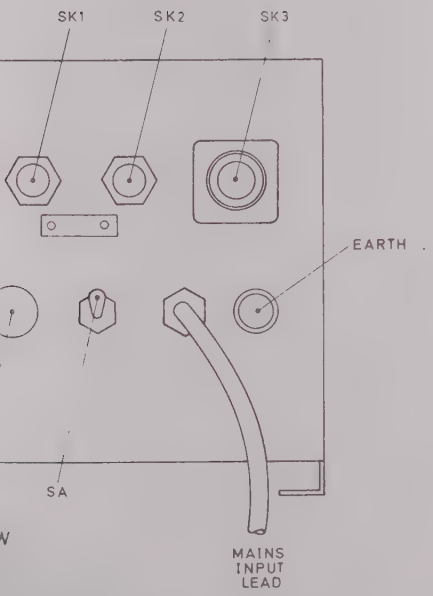
FRO

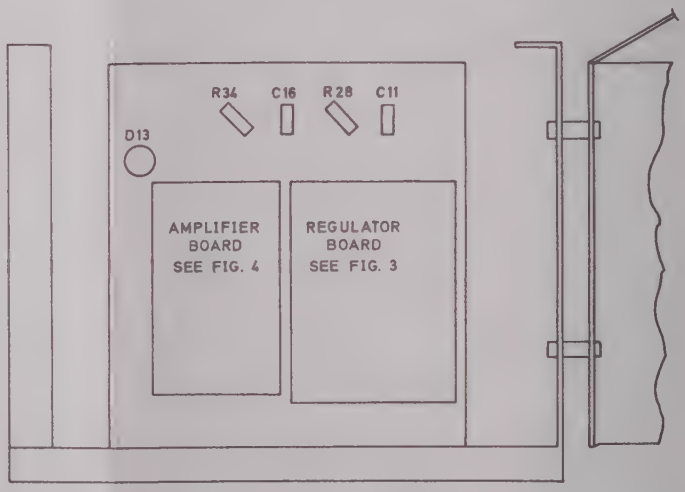
WOH1074





TOP VIEW

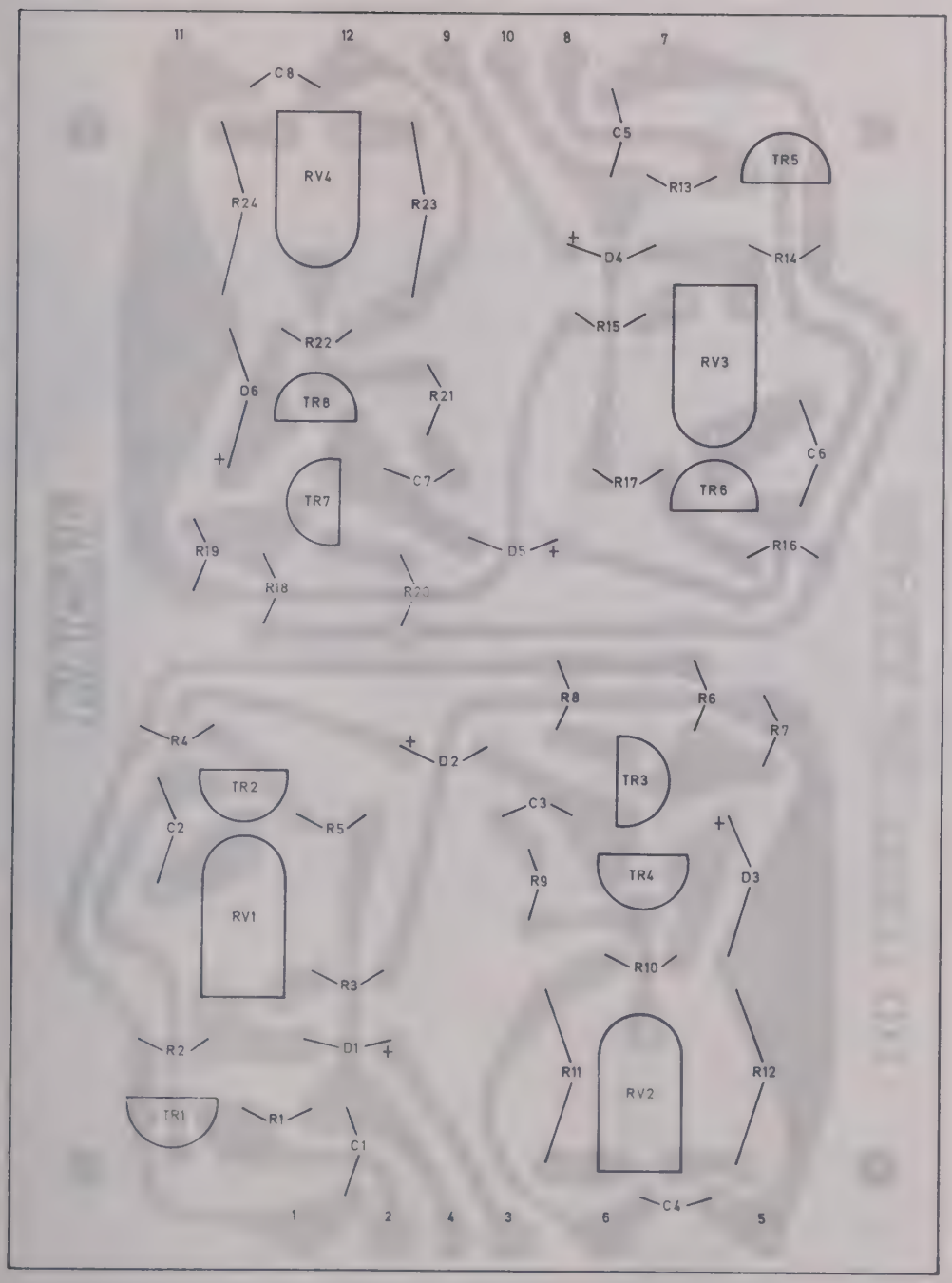




SIDE VIEW

Component Layout: MA.935

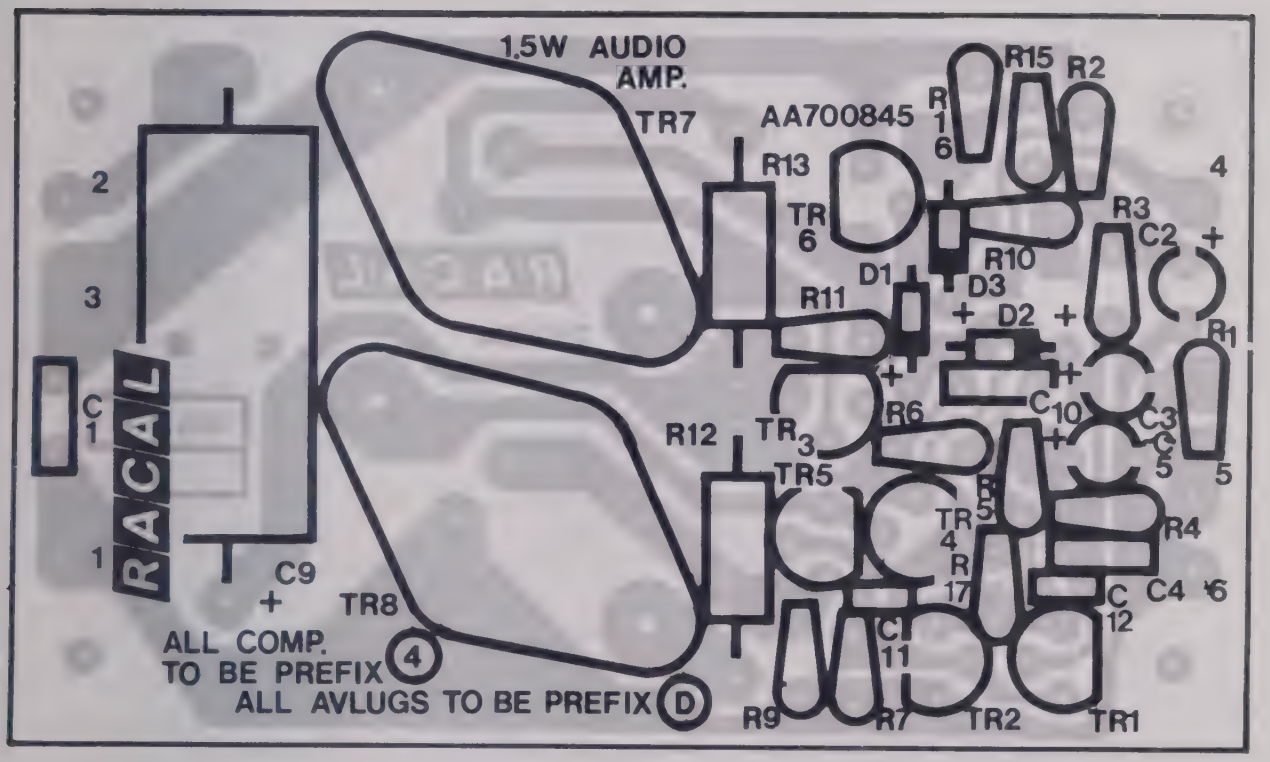
Fig. 2



WOH1074 DD713027 SHT 3
6

Component Layout : Regulator Board

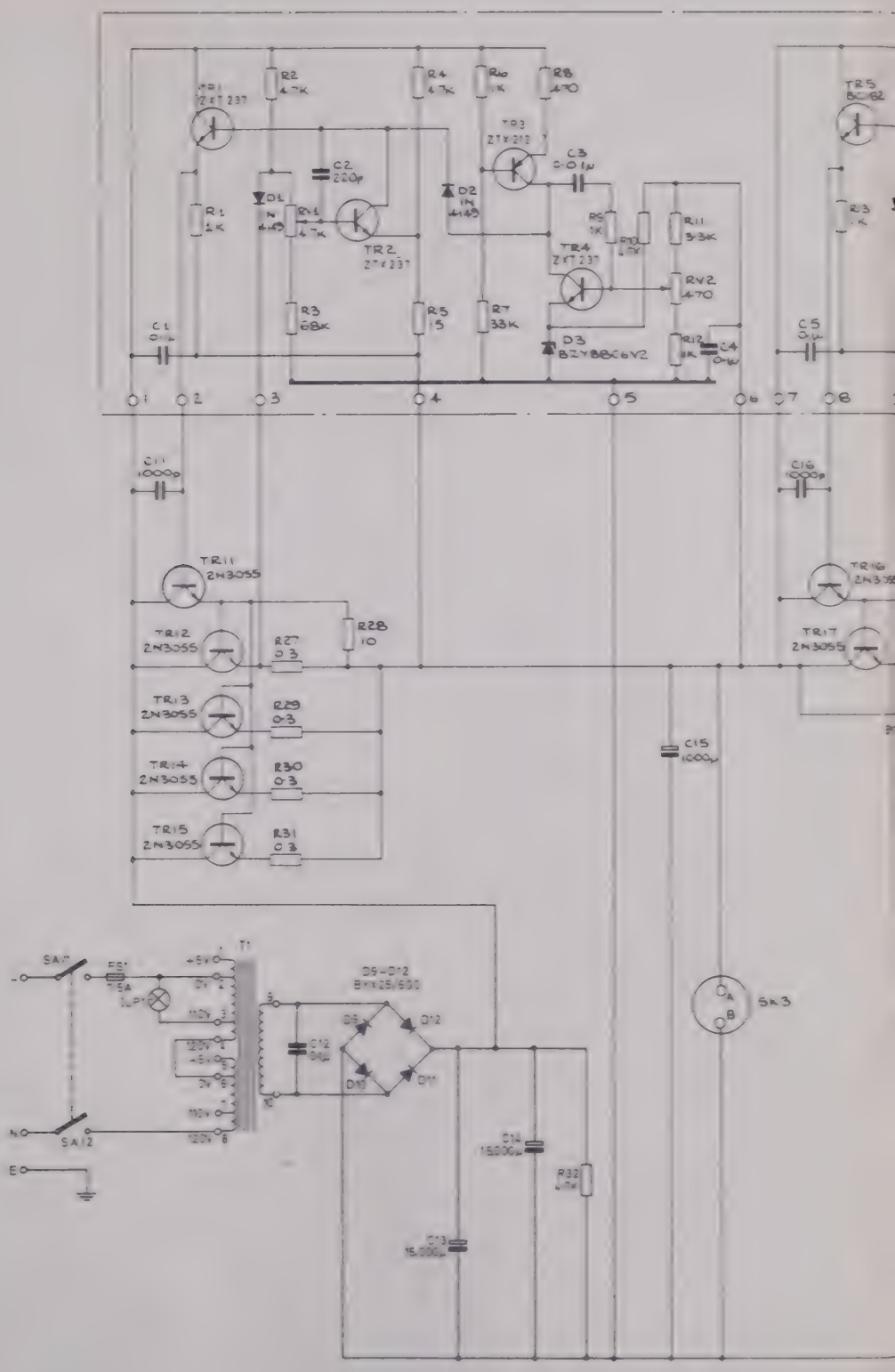
Fig. 3

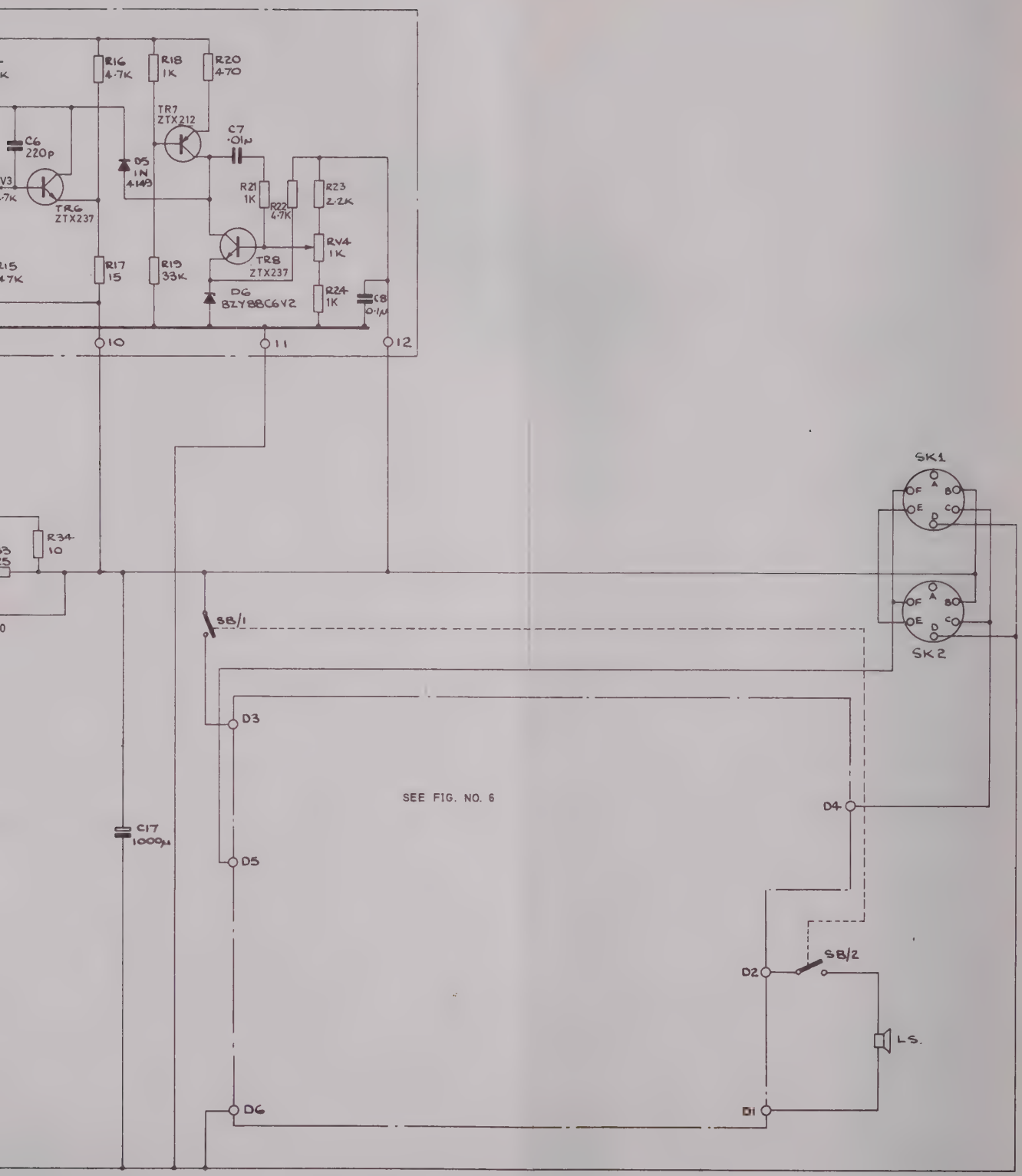


RACAL

WOH1074	CD713034	1/2
10	11	

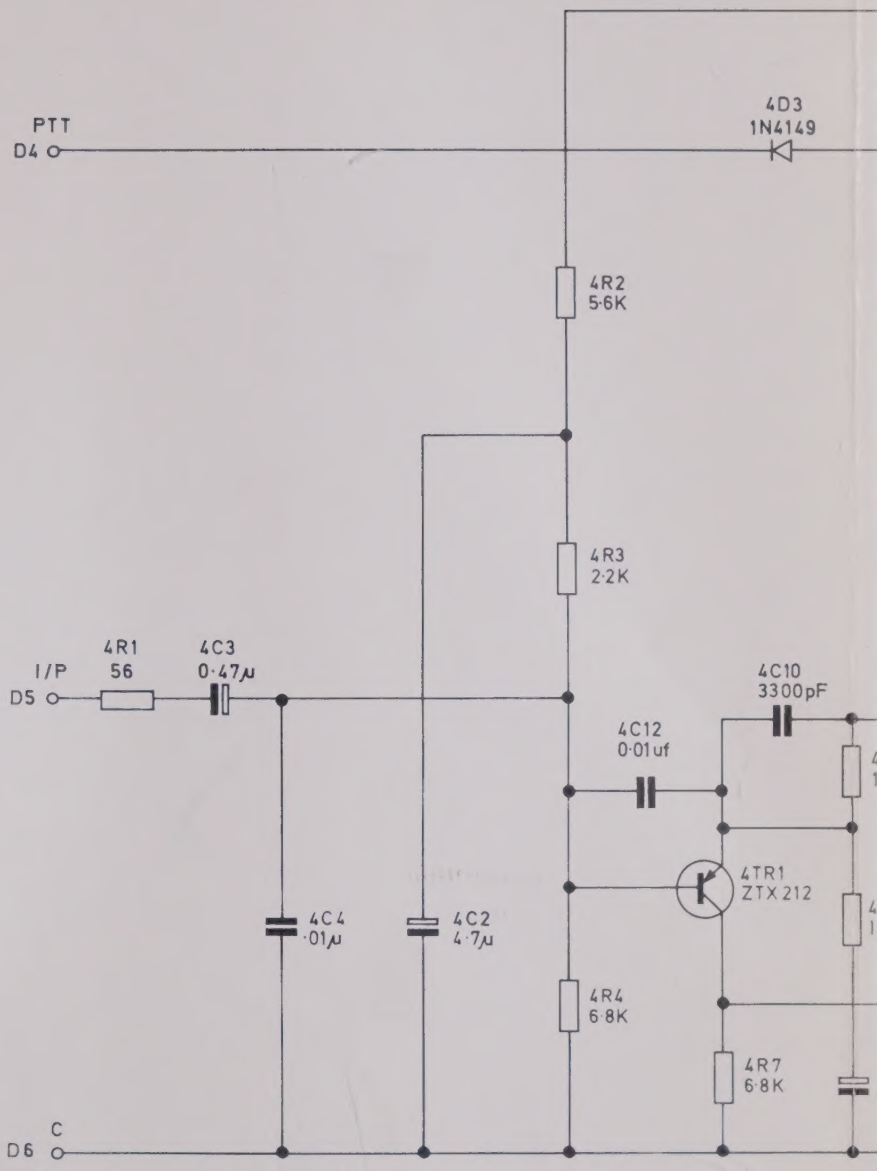
Component Layout : Amplifier Board Fig. 4

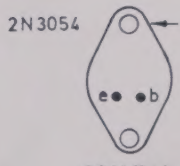

TR1 2XT237
R2 4.7K
R4 4.7K
R10 1K
R8 470
TR3 ZTX213
C3 0.01μ
C2 220p
D1 IN 4149
RV1 4.7K
TR2 ZTX237
D2 IN 4149
R1 1K
R9 1K
R10 4.7K
R11 3.3K
TR4 ZXT237
RV2 470
R3 68K
R5 1.5
R7 33K
D3 BZY88C6V2
R12 1K
C4 0.1μ
C1 0.1μ
C5 0.1μ
TR5 BC182
R3 1K
C11 10000p
C16 10000p
TR11 2N3055
TR12 2N3055
TR13 2N3055
TR14 2N3055
TR15 2N3055
R27 0.3
R28 10
R29 0.3
R30 0.3
R31 0.3
TR16 2N3055
TR17 2N3055
C15 1000μ
SA1
F6 5A
M.P.
T1
+5V
9V
12V
110V
220V
D5-D12 BYX25/600
C12 0.1μ
D5
D12
D10
D11
SA2
SK3
C14 15000μ
R32 4.7K
C13 15000μ
1
2
3
4
5
6
7
8



Circuit: MA.935

Fig. 5





SCALE 1/1

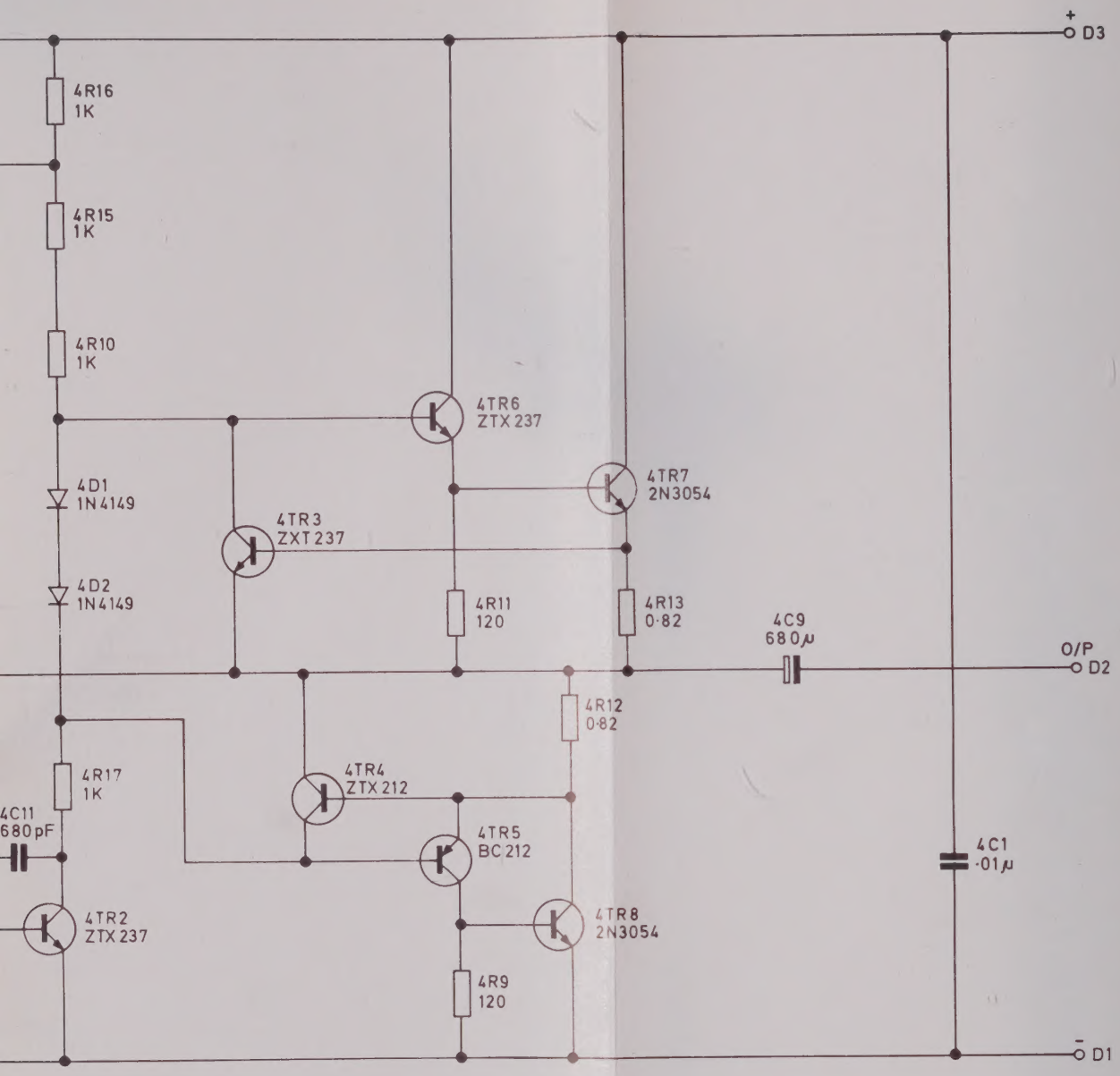
ZTX212
ZTX237

SC

TRANSISTOR LEAD CONFIGURATI
(AS VIEWED FROM LEAD SIDE

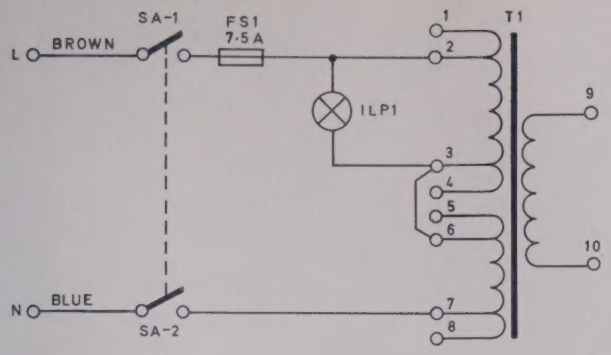
RACAL

WOH1074	CC700845
2 3 4 5 6 7 8 9 10 11 12 13 14	

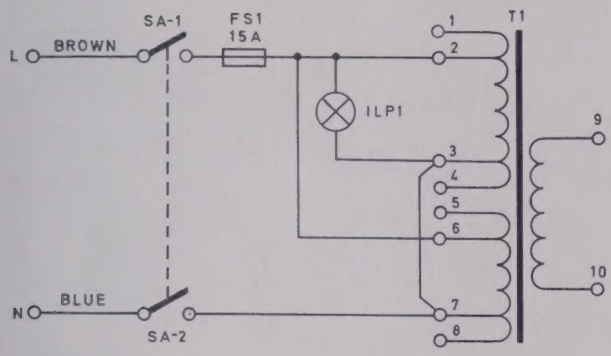


4/1

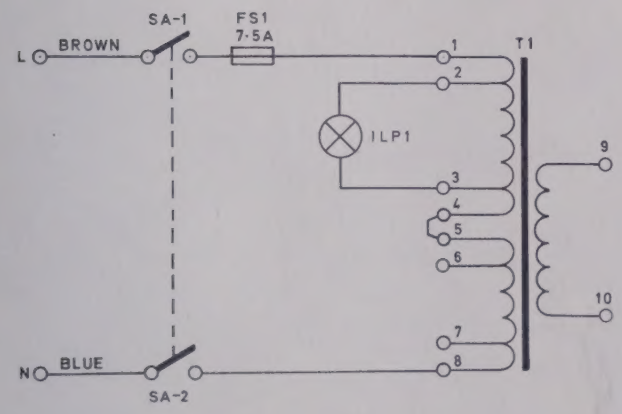
Circuit : Audio Amplifier Fig. 6



FOR 220V MAINS SUPPLY
DISCONNECT 4 AND RECONNECT TO 3
DISCONNECT NEUTRAL (BLUE) WIRE AT 8 RECONNECT TO 7



FOR 110V MAINS SUPPLY
DISCONNECT WIRE FROM 4 AND 6
DISCONNECT NEUTRAL (BLUE) WIRE 8 AND RECONNECT TO 7
CONNECT WIRE FROM 2 TO 6 AND 3 TO 7 AS SHOWN
REMOVE EXISTING FUSE (FS1) 7·5A AND INSERT 15A



FOR 250V MAINS SUPPLY
DISCONNECT LIVE (BROWN) WIRE 2 AND RECONNECT TO 1
DISCONNECT 7 AND RECONNECT TO 8

KEY TO DIAGRAMS								
TERMINAL No.	1	2	3	4	5	6	7	8
VOLTAGE	+5V	0V	110V	120V	+5V	0V	110V	120V

Typical Mains Transformer Connections

Fig.7

WOH 1074

MP MASTER
MA24121